OBSERVATIONS

ON

Gas-Lights:

BEING

AN IMPARTIAL INQUIRY

CONCERNING THE

INJURIOUS EFFECTS ON THE HEALTH OF THE COMMUNITY,

FROM THE USE OF

Coal-Gas

FOR

LIGHTING THE METROPOLIS.

BY CANDIDUS.

LONDON:

PRINTED FOR T. AND G. UNDERWOOD,

32, FLEET STREET.

1817.

Price Two Shillings.

Printed by S. Gosnell, Little Queen Street, London.

ADVERTISEMENT.

THE intrinsic importance of the subject of the following pages would in itself be sufficient apology for the Author in submitting his observations to the public eye; which he did not however originally intend to do, unless through the medium of some miscellany. On a more mature view, and considering the great public interest which has lately been attached to the scheme of lighting the Metropolis with Gas, the writer has been induced to extend his observations to a greater length than he previously intended, and therefore submits them in a distinct form.

It is not unusual with writers, especially of a junior class, to assign their *motives* for obtruding their remarks on the public attention. But as it would savour too much of gravity to

attempt a laboured " Preface" to these few cursory strictures on a familiar subject, the Author declines the task, and merely observes, that the first motive for committing the following Observations to paper, was rationally to fill a few leisure hours; and secondly, to investigate the real merits and advantages resulting from the Gas-light associations.

If in pursuit of a legitimate object—*Scientific truth*—the Author has been induced to employ censure, he has been actuated solely by motives of a public consideration; he is no farther interested on either side of the question, than as a *philosophical observer*.

OBSERVATIONS

ON

GAS-LIGHTS.

THE present age may be said to be distinguished, beyond any which have preceded it, by the rapid advancement of general knowledge among all classes of mankind. But the most striking feature in this era of improvement seems to be, the application of the principles of science to the extension of the useful arts.

It is obvious to every observer, how large a portion of our manufactures have been carried to their present state of eminence, through the aid and by the application of mechanical science; but the great variety of the arts which are more or less connected with the operations of chemistry, seem to have surpassed all other departments of human knowledge, in the rapidity of their progress during the last twenty years.

Perhaps our favoured country may afford the best arena in the world, for the perfect developement of the useful arts; although the fertile imaginations of our continental neighbours have often produced inventions and discoveries which have eminently contributed to the extension of the arts in general. The balance of merit is not easily to be determined, where one party may excel at ingenuity of invention; and the other, by mechanical genius and perseverance, bring that invention into practical application.

Some of the noblest works of human ingenuity have arisen from the joint labours of these distinct, though equally important descriptions of men. Indeed it seldom happens, that the same person with whom an invention or discovery may originate, has the ability, or even convenience, of exhibiting its practical utility to the greatest advantage: and, in consequence, those persons have been usually denominated *schemers*, by the ignorant or the thoughtless part of mankind; not considering, that the labours of philosophical men are generally devoted to subjects of great public utility, that they frequently expend the bulk of their private fortune in these researches, and that the benefits, and even the honour of many inventions, are often engrossed by some empiric

in science, whose only pretensions consist of the necessary degree of assurance, and an absolute contempt for that old-fashioned virtue, denominated *principle*.

Every man, in the least conversant with the arts, will be able to recognise this piracy on genius, in many of the *discoveries* of the day; it is, therefore, unnecessary to enumerate them. But it is much to be regretted, that, in a country like England, where the palladium of the laws is extended to the protection of all tangible property, and also to the contingent or prospective property of works emanating from the press; that it is not equally tenacious in protecting the emanations of genius, as applicable to the arts, from the piratical artifices of mechanical empirics.

It may perhaps be argued, that the rights of patent secure the invention of any man of genius. But a multitude of instances have occurred where patents have been infringed, and in which the aggrieved party has no other remedy, than a very expensive application to the Court of Chancery; in which if his finances be inadequate, he is virtually without either protection or remedy. Besides, numerous cases have occurred, in which the inventor, or patentee of an invention, has been unable to

give effect to his invention, whilst his more opulent rival, by possessing the means, is enabled, by some trifling modification, to wrest the merits of the invention, as well as its ultimate profits, from the man to whom it justly belongs.

But the history of certain inventions and discoveries of the present age, demonstrates that plagiarism is considered a venial offence, and that the self-complacency of ostentatious empirics is not easily to be disturbed by the appeals of modest merit or retiring genius. This worthy parasitical class of creation seem to admit in its full extent—"that virtue is its own reward!"

It is not our object, in the present remarks, to apply them peculiarly to the projectors of the Gas-light companies, any farther than as these personages may feel their application. Our idea is only that of *general* censure of any thing which may be called empiricism or deception, with regard to science or the arts.

It is perfectly well known, that the merit of the discovery with regard to the inflammability of the gas obtained from coal, does not rest with any of the projectors of the present Gas-

light companies. It was a discovery long antecedent to their existence either as companies or as individuals. Lord Dundonald, during his numerous experiments on coal tar, and the celebrated Dr. Priestley, in his inquiries concerning phlogiston, found the gas from coal to be inflammable; and the late worthy Bishop of Landaff made a series of experiments on the nature of this gas. In short, the disengagement of gas from the larger pieces of coal in our ordinary fires, must have afforded opportunity for any attentive observer to conclude that inflammable gas might be easily obtained from mineral coal. Its adaptation in a distinct state for illumination, by depriving it of its various impurities, is therefore the only merit of its application at the present day; and even this merit does not rest with any of the projectors of the Gas-light companies. It had been employed by many individuals some years previous to the existence of any such Company. Notwithstanding a patent was obtained by the founder of this Company, it could not have secured the privileges assumed by this half-philosophical, half-trading association; therefore they applied to the Legislature for a specific Act of Parliament, in order to secure to them the probable advantages arising from the inventions or discoveries of others!

But their Act of Parliament had a more important object, and which was sagaciously foreseen by its framers—that of giving notoriety and security to their scheme, in the eyes of the public; and thereby inducing them to become *subscribers*. The latter object is the main stay on which depend not only the Gas-light scheme, but all other companies of a similar origin; and one grand desideratum, therefore, in all these concerns is to give eclat to the measure, by every species of exertion that can attract public attention. We shall, however, leave the ingenious artifices of the joint-stock companies to their usual fate, that of premature death; and proceed to examine the comparative merits of the Gas-light scheme for lighting the metropolis.

In order to obtain a tolerable degree of accuracy, in estimating the comparative advantages of employing inflammable gas for the purposes of illumination, it will be necessary that we should take a cursory view of its nature and constituent properties.

It is well known that the gas now employed for illuminating the streets and houses of the metropolis, is obtained by the distillation of mineral coal. It is also equally well known, that it is a compound gas, consisting of hydro-

gen and carbon. We will, therefore, trace its production, and examine the phenomena attending its combustion, in order to arrive at just notions of its utility for the purpose of illumination.

If coal be heated in closed vessels, it disengages, in the first place, a dense smoke, which is a compound of sulphur, united with both oxygen and hydrogen. Next follows carbon united with hydrogen, or what is called carburetted hydrogen: the hydrogen being the menstruum in which the sulphurous or carbonaceous matter is held in solution, and maintains the gaseous state. There are also disengaged, carbonic acid gas, and an alkaline gaseous matter.

Hydrogen appears to exist in a latent or dormant state in all inflammable bodies; but it seems to prevail most in some of the varieties of wood, if we may judge from the ease with which it is expelled by a slight application of heat.

It is probable that hydrogen exists in a gaseous state, though highly condensed, in the interstices of inflammable bodies; for a small elevation of temperature enables it to burst its

limits, and evolve in the form of gas, as we find in the hissing streams of gas which are disengaged from wood or coal, long before they are heated to the point of ignition. The gas from coal is, however, more visible than that from wood, on account of the former being surcharged with carbonaceous and impure matter, which gives it the opacity we call smoke, and at the same time increases its density, so as to make it ascend but slowly through the atmosphere, and therefore more within the sphere of our observation. Carburetted hydrogen, however, in this impure state, would be totally inapplicable for the purposes of illumination; hence, it was immediately discovered by those who wished to employ this inflammable gas for lights, that unless it could be deprived of this noxious matter, it could never be used for domestic purposes, as an inflammable gas.

Now, the only mode hitherto adopted, and, perhaps, the only mode practicable on a large scale for purifying the coal gas, is that of passing it through successive reservoirs of water; by which process, the acidulous, alkaline, and oil or tarry matter, with which it is usually loaded in the first instance, is retained in solution in the water, or is deposited at the bottom of the vessels in the form of tar.

From the considerable portion of incombustible and noxious matter in the recently formed gas, it is evident that the water of a single reservoir would very soon become too impure to answer the intended purpose, and that the gas should be carried on through successive reservoirs of water. Simple water, however, will not arrest all the impure substances of this gas. Carbonic acid gas, sulphureous acid gas, and sulphuretted hydrogen gas, being evolved in the distillation of coal, they will more or less pass through the water in combination with the carburetted hydrogen, unless some chemical means be employed to arrest their progress.

Lime-water is known to attract carbonic acid with great avidity; it is therefore easy to deprive the coal gas of that acid by a solution of lime, which is economically and easily procured. But it is by no means so easy to deprive the gas of sulphureous acid, or sulphuretted hydrogen. Both these gases are exceedingly offensive and deleterious to animal life; it is therefore desirable that the inflammable gas should be purified from these substances, but it could not be effected on a large scale with sufficient regard to economy; and, perhaps, no process would entirely purify the carburetted hydrogen from sulphuretted hydrogen. It is

found by experiment that those substances which have an attraction for sulphur, have also the same for carbon: the abstraction of *all* the sulphureous gas would therefore deprive the gas of coal, of part of its valuable properties, by carrying off some of the carbon.

As the finest specimens of mineral coal afford even a large portion of heterogeneous matters which require separating from the gas, ere it can with safety or comfort be used for the purpose of lights, it must be obvious that the commonest varieties of coal, or those kinds which, in our ordinary fires, give out a very sulphureous vapour, must be less adapted to afford inflammable gas for domestic uses. Indeed, in the interior of houses, especially where a free current of air cannot be permitted, the effluvium attending the combustion of such sulphureous gas for lights, would be intolerable to the olfactory nerves, and highly noxious to animal life.

When the gas is obtained from the purest specimens of pit-coal, there is a very perceptible and disagreeable odour arising from its combustion in close rooms; but in the event of this gas being obtained from coal of an inferior quality, which is sometimes the case, it will contain a much larger portion of the peculiar subtile va-

pour, or sulphureous matter, of which no washing or filtration can ever deprive it, so as to be inoffensive or salubrious for domestic use. It is, therefore, an object of primary importance for those who may wish to employ this gas for illuminating their premises, to obtain the best Wall's End coal, or, which is better, cannel coal. For, in addition to the greater purity of the gas, by which it affords a brighter light, and is not so deleterious to respiration, it has been proved that such coal will afford a much larger quantity of inflammable gas than the inferior, or sulphureous kinds of coal. Both health and economy are, therefore, involved in the employment of the very best coal for this purpose.

In order to show more fully the properties of carburetted hydrogen gas, which is now in such general esteem, on account of its convenience, cleanliness, and facility of management, I shall notice the leading properties uniformly assigned by chemists to the component matter of this celebrated gas.

Hydrogen is a substance which has never yet been found in nature, without being in combination with some other matter. Its most simple form of existence is that of gas; and in that state it is the lightest substance known in

nature, twelve measures of hydrogen gas weighing only equal to one measure of atmospheric air. It is obtained for the purposes of philosophical experiment, in a variety of ways, by the decomposition of water; but, from its extreme levity, and the attraction, or capacity, which it exhibits for other substances, it cannot be obtained in a state of purity without considerable attention.

Hydrogen gas is frequently found in nature, but always in combination with one or more of the inflammable bodies. During the putrefaction of animal bodies, it is evolved in conjunction with phosphorus; and in the vicinity of decayed animal substance and stagnant ditches, it sometimes presents those luminous appearances by night called *ignes fatui.*

Hydrogen combined with sulphur, termed by chemists, sulphuretted hydrogen gas, is also produced during the corruption of animal and vegetable substance, and feculent matter; especially if that process takes place in a very confined situation. Hence proceeds the intolerable effluvium from the habitations of the poor in crowded cities.

Sulphuretted hydrogen is not only extremely noxious to animal life, but it corrodes metallic

bodies, and defaces domestic furniture in a singular degree.

But the most usual combination of hydrogen with an inflammable base, is that of hydrogen and carbon, or what is chemically denominated carburetted hydrogen.

From the universal prevalence of carbonic matter, many of the operations of nature, as well as many of the arts connected with chemical process, yield carbon in great abundance. But carbon alone being incapable of maintaining a gaseous form, whenever it is disengaged by the processes of fermentation, or the putrefaction and decomposition of bodies, it immediately unites either with hydrogen or oxygen. If it be disengaged in the ordinary state of the atmosphere, it unites with the oxygenous portion of the air, and forms carbonic acid gas, or fixed air, which is well known to be fatal to animal life, and incapable of supporting combustion.

During the disengagement of carbon by the process of vegetable decomposition, however, hydrogen is also evolved; and as the latter, on being liberated, always assumes the gaseous form, and evinces a strong attraction for carbon, these two substances unite, and form the carbu-

retted hydrogen gas found in the vicinity of decaying vegetable substances.

It is well known to those who have only a cursory knowledge of chemistry, that all inflammable substances are incapable of combustion without the presence of *oxygen*. Thus, hydrogen gas, or inflammable air, will extinguish a lighted taper, if it be plunged into a vessel of that gas. Hydrogen is also incapable of supporting animal life, if it be inhaled into the lungs in a state of purity; but even if it forms any considerable portion of respirable air, it is highly deleterious.

If carbon be dissolved in hydrogen gas, constituting the carburetted hydrogen before mentioned, the properties of the gas are not very materially changed. Though it is more inflammable than pure hydrogen, yet it will not burn without the presence of oxygen, which it obtains from the atmosphere during its combustion.

Carburetted hydrogen gas, when ignited, yields a stronger heat and light than pure hydrogen. The latter burns with a kind of transparent flame, tinged with red; whilst the compound gas, when tolerably pure, affords a bright white flame, nearly equal to wax light. Carbu-

retted hydrogen is, however, more unfit for sustaining animal life, than even pure hydrogen, as we shall find by observing what takes place in the process of respiration:—

If we inhale tolerably pure atmospheric air, which does not usually contain any sensible portion of carbonic acid, and, after retaining it in the lungs for the space of a few seconds, exhale it into a bladder provided with a stop-cock, and afterwards submit that air to the usual test of lime-water, we discover that it has obtained carbonic acid during its passage in our system. The volume will not be reduced, but the oxygenous, or pure part of the air, will be converted into carbonic acid gas; and which change can only be ascribed to the carbon it has absorbed, or taken up, in the air-cells of the lungs.

Now, if the air we respire be already charged with carbon—whether it be with carbonic acid gas, or carburetted hydrogen gas, for they are both noxious to animal life—it is obvious that such air cannot be so well adapted to maintain respiration, nor to purify the lungs from the feculent or carbonic matter which is deposited in that organ by the venous blood, as an atmosphere consisting of the usual degree of purity. Indeed, we may consider it an axiom capable of every demonstration, that carbon

cannot exist in the air without destroying its salubrity. In small quantities, its effect is not easily perceptible; but when it prevails in any considerable quantity, such as in the vicinity of manufactories, where great masses of fuel are consumed, it vitiates the air in a very serious degree, and exercises its baneful effects on the pallid inhabitants of our large manufacturing towns, by silently, though with fatal certainty, inducing the disorders so peculiar to those districts—pulmonary consumption and asthma.

Having shown that both of the constituents of carburetted hydrogen are deleterious to animal life, we will now enquire, how far the combustion of that gas for domestic uses may influence the animal economy.

It is acknowledged, as we before observed, that no combustion can be carried on without the presence of oxygen gas. In short, the process of combustion is nothing more than a new combination of the various substances consumed. Oxygen gas, which is obtained from the atmosphere, unites with the inflammable substance, and forms water and carbonic acid; but the bulk of these new compounds bears no proportion to the combustible or gaseous body consumed by the process; and the agitations of the atmosphere carrying off these fluids nearly as

soon as they are formed, it is not perceptible. The object of all combustion being that of affording light and heat, whilst this *result* obtains our attention, we generally disregard the chemical changes induced on the materials employed, unless our views are directed by philosophical research or civil economy.

It is quite manifest that the salubrity of the air for the purposes of respiration must, therefore, be greatly decreased by the consumption of part of its oxygen in combustion; and this will be in proportion to the quantity of ignited substance consumed. In very confined rooms, having no chimney, if combustion be carried on only for the period of a few minutes, the air will be so far deprived of its oxygen by the process, as to be incapable of supporting respiration: or, in other words, the azote of the air and the carbonic acid produce suffocation.

It is remarkable that all the various substances which are employed for combustion and illumination are composed of nearly the same principles—carbon and hydrogen, with, perhaps, a small portion of oxygen. Whether we take wax, spermaceti, oils, tallow, wood, or coal, they uniformly yield carburetted hydrogen gas, when brought to a certain degree of heat; and the intensity of the light which they

afford, together with their leaving no unpleasant odour, is the criterion of the purity or fitness of these bodies for illumination.

In the combustion of all these substances, however, the inflammable body must be raised to a temperature which shall disengage the carburetted hydrogen in a state of gas before inflammation can take place; which temperature is something about 600° of Fahrenheit: but it varies a little with different substances.

There is an essential difference, therefore, in the process, whether we employ either of the preceding inflammable substances for the purpose of illumination, or whether we make use of the same constituent matter, previously brought to the gaseous state,—as we shall endeavour to prove:—

During the consumption of tallow, or wax, in burning the ordinary candles, if they be properly manufactured, or, in other words, if there exists a due proportion between the size of the cotton wick and the tallow; the latter will not be melted, and brought to a gaseous state faster than it is capable of being consumed. It is on this principle also, that good hard tallow is preferable to the softer kind, and that wax and spermaceti are still better for the manufacture of candles; the inflammable matter

not being converted to the fluid and gaseous state, faster than it is required; and which can always be regulated by the size of the cotton wick.

If oil be employed for affording lights, a much less portion of cotton will be necessary to maintain the combustion of a pound weight, for example, than for an equal weight of tallow, on account of the oil being already in a fluid state, and, consequently, not requiring so large a portion of heat, to convert it into a gaseous or inflammable state.

It has been found, however, that during the burning of the ordinary lamps, some part of the inflammable vapour will always escape unconsumed, especially if the surface of the oil be exposed to the air. Hence, a loss of combustible matter ensues, which in the aggregate must be very considerable.

By the successive improvements on lamps, and particularly that of applying glass cylinders, or globes, immediately round the flame, the illumination is more perfect, and part of the inflammable gas, which would otherwise escape, is by this means consumed. It is, however, impossible to prevent the escape of some portion of this carburetted hydrogen, or, as it

has been called, olefient gas *, from the burning of oil; and in close rooms it is highly disagreeable, and constitutes what is usually called "the smell of lamps."

Now, if it be found, that, during the combustion of all the inflammable substances, the body be reduced to the gaseous state more rapidly than it can be consumed; or, in other words, faster than the supply of oxygen from the atmosphere can be maintained; the inflammable gaseous matter must be dispersed in the air of the room where it is evolved. And we have previously shown, that this compound gas is highly noxious to animal life.

It is, therefore, a fallacy for the advocates of the Gas-light system to pretend, that "the combustion of this gas does not vitiate the purity of the air where it is burnt †." From the

---

* Carbon seems capable of uniting with hydrogen in two different proportions: the first is denominated "light carburetted hydrogen," or the inflammable gas used for the *Gas-lights;* and the other combination, containing a larger proportion of carbon, has been called heavy carburetted hydrogen, or olefient gas, because it is evolved during the decomposition of oil, alcohol, and other inflammable matter. It is, however, not equally combustible as the former gas, apparently from its being surcharged with carbon.

† Vide "Accum's Treatise on Gas-lights," with the authorities therein mentioned, in favour of Gas-lights.

presence of oxygen being indispensable for the support of combustion, every ignited substance must abstract a portion of that gas from the air, and, consequently, the greater the combustion, the greater the consumption of oxygen.

But there appear to be two causes why the combustion of gas should deteriorate the air of a room, more than that of tallow, wax, or oil.—First, from its being already in a state fit for instant combustion, and of incorporating with or seizing on the oxygen of the air with greater rapidity than those inflammable bodies before mentioned. And secondly, from the levity of this gas, it will have a strong tendency to escape towards the ceiling of the room, unconsumed, if the atmosphere cannot supply it with oxygen with sufficient rapidity,—which will always be the case when the apertures of the gas pipes are too large.

We shall give some idea of the consumption of oxygen during the burning of this gas, when we state that one cubic foot of gas requires for its perfect inflammation, about two cubic feet of oxygen *. Now, in round numbers, the oxygen, or pure part, forms about two tenths

* Vide Sir H. Davy's Account of the explosive mixtures of carburetted Hydrogen and atmospheric Air.

of our atmosphere; consequently, the combustion of every cubic foot of gas will absorb the oxygen, or vital principle, from nearly ten times its bulk, or ten cubic feet of the air we require for maintaining respiration.

Perhaps one of the greatest disadvantages attending our respiring a vitiated atmosphere, is that of our being unconscious of the deleterious effect during its operation. We are usually solicitous respecting what kind of aliment or beverage we take, because the almost immediate effects of these agents point out to us that which may be the most salutary. But from the insidious mode of attack on our system which accompanies a depraved atmosphere, we are not equally on our guard; and we do not usually discover the danger until the enemy has made a formidable approach. When it is considered, that by every inspiration we make, which, in ordinary cases, is about thirty per minute, we inhale a portion of the air, which is an indispensable agent in purifying the blood in our system, by the oxygenous or pure part of the air absorbing and carrying off the carbonic matter in the lungs; it is obvious how highly important it must be to maintain the air in a state of purity for respiration, or, at least, that it shall not be previously vitiated by holding carbonic matter in solution.

The first effect of a corrupted atmosphere, on the human temperament, is that of inducing a certain languor or faintness; the respiration afterwards becomes more laborious and imperfect; and the circulation of the blood, in consequence, is not accelerated to that degree which is necessary to maintain health.

Now, it is well known, that nothing vitiates the air for respiration, so much as the combustion of inflammable substances. But as domestic and civil economy renders this process indispensable for producing heat and light, it becomes us to guard against its injurious effects, by every precaution in our power. In all large rooms or buildings appropriated to the accommodation of a considerable number of persons, and which are generally used in the evening and require artificial light, it is therefore of great importance, that the air should be vitiated as little as it is possible by combustion; or, in other words—that the lights should be furnished from the *purest materials*, and the combustion be as *perfect as possible.*

Of all the assemblies of persons, under the different heads of places for divine worship, theatres, banqueting-rooms, and ball-rooms, perhaps none require the perfect ventilation of the air so much as the latter kind. In the sa-

lutary exercise of dancing, our lungs respire probably double the quantity of air that would suffice us when at rest; which arises from the animal system being exhausted by the exertion, and, consequently, requiring the renovating aid of the oxygen of the air. Hence it is obvious, how injurious to the air of such rooms must be the combustion of inflammable gas for lights, which, as we have before observed, greatly depraves the atmosphere for the purposes of respiration. It is peculiarly noxious to persons with delicate lungs, and if long continued, would in itself induce asthma and consumption, with all their melancholy results.

It is however, by no means certain, even if the combustion of inflammable gas be perfect, that the residuary matter, after its combustion, must be innoxious; as we shall find by examining the product of its combustion.

If the gas be burned in a closed vessel with just sufficient oxygen to maintain the combustion, the residue will consist of water and carbonic acid; part of the oxygen uniting with the hydrogen, and forming water; the other portion of oxygen uniting with the carbon, and forming carbonic acid.

Now, although the water which is formed during the burning of this gas cannot be said to be unwholesome; yet carbonic acid gas, as before mentioned, is highly noxious, and if it be constantly evolved in a room, must greatly vitiate the air for respiration.

We may, therefore, fairly draw the two following conclusions, with regard to the burning of this inflammable or coal gas in rooms :—

1st, That if any of the gas be permitted to escape unconsumed, or, which is the same thing, if its combustion be not *perfect*, which is always the case where a free current of air cannot be allowed; it is not only offensive, but highly noxious to animal life.

2dly, That, owing to the rapid abstraction of the oxygen from the air, for the combustion of this gas, and the carbonic acid evolved as its product, the atmosphere of any room where it is burnt in considerable quantity, must be greatly vitiated for animal respiration.

Having taken a cursory view of the substitution of inflammable gas for illumination, in

lieu of tallow or oil, as relating to its physical properties; we will briefly examine its comparative advantages with regard to civil and domestic economy.

It must be acknowledged by every person who has seen the leading streets of the metropolis, both before and since the application of the Gas-lights, that the advantages are decidedly in favour of the illumination by gas. There seem to be many advantages, as connected with the police of so large a city as London, in employing the Gas-lights for the street lamps, whilst there appears to be little objection to the measure, provided the light can be furnished at nearly the same expense as oil. As a measure of economy, however, we are not able to form an adequate opinion; for although Mr. Accum, in his "Treatise on Gas-light," has furnished us with comparative tables of the expense of Gas-lights, and of tallow and oil, which seem to prove the great economy of employing coal-gas; yet the Gas-light Company have stated to the public, that they cannot afford to light the streets of the metropolis, but for the profit arising from those who use it for lighting private houses. Now, this information leads us to inquire into the advantages of Gas-lights for the interior of houses.

It is admitted, that, when the apparatus is once laid on, illuminating a room by gas is not attended with the trouble nor the dirt occasioned by oil-lamps. It seems in this respect to be well adapted for shops, especially those which have the doors usually kept open, or where a free current of air be allowed to ventilate the room. But in such shops or rooms as are kept closed from the external air, the gas not only disengages the noxious effluvia before mentioned, but, from the want of a sufficient supply of oxygen for its *perfect combustion*, it deposits a considerable portion of carbonaceous or sooty matter on the ceiling, walls, and furniture, and would of course materially damage a multitude of articles of any delicate description, exposed in shops for sale. In many rooms where this gas has been used only for the space of a few months, it has coated the walls and ceiling perfectly black. It is also quite obvious, that such carbonaceous matter must have existed in a gaseous or respirable state, ere it could be deposited on the walls; and that it must be deleterious to animal life, we have previously shown.

We may, therefore, justly draw the following conclusions respecting the eligibility of employing coal-gas for illumination:—

1st, That for the purpose of lighting the streets, it is decidedly superior to oil lamps.

2dly, That in open shops, or other places where a free current of air may be permitted, so as to afford a perfect combustion of the gas, and at the same time to ventilate the room, it is superior to oil or tallow for stationary lights, though inapplicable for portable lights.

3dly, That, for the interior of dwelling-houses, sitting-rooms, or audience-rooms of any kind, for the assemblage of a large number of persons, it is peculiarly unfit; both on account of a strong current of air being inadmissible in such places, and the gas, both before and after combustion, yielding noxious matter to the atmosphere of the room, and consequently greatly vitiating the air for the purposes of respiration.

From the mercantile speculations of a great number of persons, who have embarked certain capital in the different concerns called Gas-light Companies; and as one of these companies have required of the Legislature exclusive privileges and protections in order to maintain and forward their "*scheme*," it may not be improper briefly to examine the merits upon which

that demand rests, in order to have a better view of the eligibility of the measure, as a national object.

It has always been considered as a grand leading principle in political economy, that legislative influence or protection should only be afforded to those institutions or communities, which have been demonstrated to be connected with the welfare and advantage of the body politic. Legislation on partial views, or protection towards local interests, has always proved to be prejudicial to the welfare of the public in a general sense.—Therefore, in all applications to the Legislature for special sanction and privileges, *demonstration* of national utility and advantage ought always to precede the investigation of local advantages or private emolument.

The history of this country during the last twenty years, affords abundant proofs of the facility with which speculators, or rather adventurers, have held out *golden prospects* to the unthinking though respectable part of the community, so as to involve them in the most abortive and absurd schemes, which have had no other effect than that of filling the pockets of these "projectors" at the expense of their deluded and often ruined subscribers.

How many schemes of this sort, under the various denominations of canals, rail-ways, bridges, tunnels, fire-offices, &c. &c. &c. have been projected by adventurers; which now only remain as a beacon of the duplicity of projectors, and of the credulity of the better classes of society!

Perhaps there can scarcely be found a single instance among all the various *schemes* of this sort, in which the projectors have not made the most glaringly false estimates in the first instance, in order the more easily to induce the public to embark money in the concern. The "Prospectus" of such schemes is in general not merely an enumeration of the practicable advantages which would result from such a measure, but it is usually adorned with a large share of contingent and *impracticable advantages!*—Such productions are more commonly a specimen of the *talent of invention*, than the candid and dispassionate calculation of men of ability and integrity.

If any apology were necessary for noticing this extended evil, of adventurers, under specious calculations, inducing the middling classes of society to embark all their small savings, or unemployed cash, in ruinous speculations, the present moment is in point; when, from the

general stagnation of trade at home, and the unsettled state of the foreign markets, mercantile men have no means of beneficially employing their capital, and are, therefore, more liable to fall into the snares of those Utopian projectors.—To return, however, to the immediate subject of our inquiry :—

It must be admitted, that the " incorporated Gas-light Company," founded on the same extravagant calculations as nearly all the joint-stock societies of the present day, has not, however, had so fatal an issue to the proprietors or subscribers, as many other associations, the original £50 shares never having fallen more than 20 per cent. But this kind of *negative* prosperity has been more owing to the parliamentary protection this Company obtained, and to the *dazzling* nature of the subject, than to any conviction of its national utility or economy. It may be said to have produced an *ignis fatuus* which has diverted its followers from the straight road of philosophical examination, and borne them away triumphant in an aërial vision!

The people of this country are unfortunately too easily led on those occasions by this first question :—" Is it likely to prove a good speculation?" We need not remark that they are always answered in the affirmative.

As a question of civil economy, however, there appear to be some considerations respecting the substitution of Gas-lights, for tallow and oil, which demand notice.

It is well known that the natural products of the British islands are quite inadequate to the supply of many of the necessaries of life to their inhabitants, and among other commodities we are obliged to import vast quantities of tallow and oil from the Baltic and other parts of the world. Indeed, the consumption of oil in this country is so considerable, as alone to give employment to many thousand tons of shipping annually, and subsistence to a very large number of those valuable bulwarks to the state—*British seamen.*

To enter into this question as the merits of it might demand, would very far exceed our limits; but we may briefly remark, and it may be asserted without fear of contradiction, that whatever has a tendency to foster and maintain that important class of men, British seamen, ought to be considered as affording vitality to the state. And the future welfare, and even existence of the country may be said to be compromised, by any measure which operates to exterminate or abandon these hardy defenders of their native isles.

It is not unusual with short-sighted politicians, to recommend the abandonment of the importation of any commodity, for which a substitute may be found in the British islands: not considering, that if we do not import from other countries, we shall get no market for our export commodities. Foreign nations cannot be expected to admit our manufactures, unless we receive their surplus produce. In fact, they could not deal with us but upon these conditions; and it is this reciprocal advantage which constitutes not only the commercial prosperity, but the political strength of all maritime states. Can it admit of any question whether Spain derives half the advantage or real riches, by sending her ships to bring home treasure from her colonies, with that of the barter trade carried on by Great Britain, Holland, or America? What has been the source of the riches and power which England has exhibited during the late war, but her extensive foreign commerce? What has supported our greatness and defended our existence as a nation but British seamen?—Yet it has been argued by some, and among the number the Gas-light advocates, that we ought to sacrifice *national* to local interest, and employ coal for illumination in lieu of tallow and oil, because the former is a *native product*. It cannot admit of doubt, that national riches and national strength

will always be best consulted by those measures which give subsistence and employment to thousands, though it probably may not be so favourable to the views or interests of any petty community.

It might be argued by those who are interested in the Gas-light scheme, that the coals they consume for the production of gas, have also given employment to our shipping concerned in the Newcastle trade. The extra demand, however, created by the consumption of coals for the Gas-lights, is too insignificant to require notice. And even this small amount of tonnage has lately been taken from the general trade, and the profits engrossed by the Gas Company. So much for the *public* spirit of these companies!

In addition to the consideration, that the importation of tallow, oil, fish, &c. is of the greatest importance in a commercial point of view; it gives employment and subsistence to thousands, and the profits are disseminated among a great number of persons connected with the shipping trade: whilst the profits, or rather the *benefits*, of the Gas-light scheme, are engrossed by a few projectors, conductors, or managers.

In point of general utility, therefore, but more especially of *ultimate* national advantage, the Gas-light scheme will not bear a comparison with the many and important considerations attached to the employment of oil and tallow for the purposes of illumination.

For the same reasons, however, that we argue against the exclusive substitution of gas for lighting the streets of the metropolis, we should condemn any premature rejection of its partial use. We only object to the principle of *chartered privileges.* The fairest criterion by which we can judge of the merits of any invention, is the *unsolicited* adoption it receives from the public. For the bulk of mankind will always decide justly on any intrinsic merits, though they will usually require sufficient time to strip any idol presented to their notice, of the veil, or false colouring, which either the duplicity or injudicious taste of an artist might have thought a necessary embellishment!

We shall conclude our observations on Gas-lights, by a few incidental remarks on the system and management of the Gas-light Company, as applicable to lighting the metropolis.

This concern, like most other schemes of a similar description, was neither projected, nor the incorporation charter obtained, with a view to public benefit. It was originated for the private advantage of the projectors and managers, and supported by the subscribers, or proprietors, as a good mercantile speculation. Notwithstanding that public utility is always announced as a leading feature of the *prospectus* of any measure of this kind, it is probable that not five in one hundred of the subscribers to the Utopian schemes of the day, would be induced to embark their money, nor the managers to dedicate their time and attendance, merely *pro patria!*

However, if any measure be found to be highly conducive to the public advantage, whatever might have been the motives from whence it originated, the public ought to acknowledge the obligation, and, in a certain degree, to indemnify the parties from whom the project emanated. Under this view, it might be fair and equitable, that the public should allow the Gas companies a greater price for lighting the street lamps, as a sort of compensation for their expense of laying down pipes; provided they did not obtain very superior profit by lighting private houses and shops.

Although the lighting of the streets with gas has met with general approbation, and is, therefore, entitled to support, whilst it is accomplished with equal economy to that of oil lights, and the full supply of light maintained; yet the Gas-light Company have told us, that they cannot "*afford* to light the streets at the price for which they contract, *without also lighting private houses on an extended scale* *." Now this is a *very* important consideration, as we before observed; the fact is simply this: that they cannot afford to execute that which is *beneficial* to the public, without also doing that which is *injurious* to the public! The chartered Company, therefore, applied to the Legislature, not only for exclusive privileges over other Gas companies, but for the patronage and sanction of Parliament to a scheme, which they knew must be liable to many objections that minute examination, or practical research, might ultimately reveal.

However pompously the advantages of any new scheme may be announced to the public, mankind, or at least the considerate part, will always form their opinions according to its intrinsic utility. Thus, the Prospectus of the

---

* See the evidence offered to the House of Commons, on the Gas-light Amendment Bill, last session.

Gas-light Company promised incalculable advantages to the public in adopting their gas-lights, coke, tar, ammonia, &c. With regard to the first of these products, coal gas, its comparative advantages are briefly discussed in these pages. As to the coke made by the Gas Companies, it is decidedly inferior to the coke made in the ordinary way on two accounts: it is deprived of its combustibility and consequent durability, from having the *whole* of the inflammable gas extracted for the Gas-lights, and thereby nearly reduced to the state of cinder,—and from its being made in air-tight vessels, it retains a disagreeable alkaline effluvium, which is allowed to escape in the ordinary manufacture of coke. The inferiority of the Gas-light coke is proved by the low price obtained for it in the market; it is, in fact, not sufficiently combustible to be used alone, without a strong current of air, and used in large masses.

With regard to the tar procured from the distillation of coal, it may be of some value in the arts, if obtained in the way Lord Dundonald suggested; but as a *residue* of the process, instead of being the chief object of the process, it is evident that great part of the bituminous or resinous part, which constitutes its only value as tar, will be carried off in the state of gas. The substance called tar by the

Gas Companies, is deficient in the first requisite of tar, that of resisting the effects of the weather when laid on buildings, &c. It is, in fact, the refuse substance of the gas manufacture; and consists of a mixture of carbonaceous, earthy, acidulous, and alkaline matter.

As to the liquid ammonia—the last "valuable" product of the Gas-light manufacture,—its very limited use in the arts, even if pure, would render this article of little value. But it is obvious, that this alkaline liquor must also be charged with considerable impurities, especially with sulphuretted hydrogen, which gives both the tar and this liquor that intolerable odour for which it is distinguished.

It is impossible for the public to prove the accuracy of the statements of the Gas Company, as to their profits; or whether they would be losers by lighting the street lamps, at nearly the price paid for oil lights, without examining their accounts. It is obvious that they will use every argument to induce the public to admit the introduction of the gas into private houses, by which they obtain a far greater profit than by lighting the street lamps. There is also this additional consideration to be noticed: that the expense incurred by individuals for the apparatus necessary for laying on the Gas

burners, amounting in many cases, to from £20 to £50, according to the number of lights, operates as a security to the Company, for the continuance of the use of Gas-lights, though it might subsequently be found objectionable. Persons having once been at considerable expense in making any change, have usually two reasons for persevering: one is, the consideration that so much expenditure would be actually sunk, if the plan be discontinued; and the other, that few like to acknowledge their incapacity of judging, or that they have followed the current without knowing either its source or its issue. This adoption of the *fashion* of the day has always distinguished the English people, and is the main spring of all those schemes called joint-stock companies.

Now, as the Gas-light Company have certain chartered privileges, and as their permanent interests are guaranteed, as before observed, by the expense incurred by individuals, it seems perfectly equitable that the public should also have a counter-security from the Company. Two or three conditions, therefore, ought to be imperative on the Gas Company, in return for their privileges:

1st, That the Company should be compelled to use the best coal in their process; and that

the gas should be purified to the utmost possible extent.

2dly, That there shall be, at all times, a full and uniform supply of gas in the reservoirs and pipes for the public use.

3dly, That the Company should enter into securities, to continue the supply of gas, for any period that an applicant may require, or at least for a *certain* period; so as to indemnify those who have been at considerable expense in adopting their lights.

With regard to purifying the gas, it is obvious that the health, cleanliness, and comfort of the public are immediately concerned. We have already shown that, even in its purest state, the combustion of this gas impregnates the air with noxious effluvia. But if it be obtained from the common or sulphureous kinds of coal, or if it has not been perfectly purified from the tar, sulphureous gas, and volatile alkali, it is evident that the disagreeable and injurious effects of its combustion will be much increased.

It is also of indispensable importance that there should be at all times an adequate, or rather an abundant supply of gas in the pipes and

gasometers to allow for waste in the event of a pipe leaking, or an accidental explosion at the manufactories. It is a probable event, that, in a certain period, the sulphureous acid which accompanies this gas, may corrode the interior of the smaller pipes, so as to produce leaking; and it is also possible for the tarry substance to choke the smaller apertures and the angles of the vertical pipes, by which the supply of gas for lights will be defective, if not altogether impeded. It has been lately observed that the Gas-lights of the streets, as well as those in houses, have been by no means so brilliant as they were when first laid on. Whether this arises from insufficiency of supply, or obstructions in the pipes, we know not: the effect is, however, the same to the public, whatever may be the cause.

Those who are best acquainted with the nature of this inflammable gas, well know the possibility of accident with the Gas-light apparatus. We before observed, that if gas be dispersed in the air, and it comes in contact with flame, a dreadful explosion ensues. Or, if a gas pipe leaks, or should be left open by negligence so as to allow the escape of a few cubic feet of gas, an explosion would inevitably be produced, on taking a light into the room. But if by any accident, whether

unavoidable, or from carelessness, the Gas-lights of the metropolis were extinguished even during one night, the confusion and inconvenience arising from such an event can be better imagined than described!

The expense to which individuals are subject in having the gas pipes and apparatus necessary for private houses, seems to warrant their demanding a guarantee for the continuance of their contract. For in the event of the Gas-light Company not continuing their supply, either from accident or failure, the public would be left without any indemnity for the money they had expended. And it surely cannot be said that the Gas-light Company, notwithstanding the *new lights* it has shed on mankind, should be assured of its perpetuity; or, an exemption from the mutability of all joint-stock companies.

We do not profess to be acquainted with the *interior* management of the concerns of this Company, or whether they conduct it with all the attention which is required in a measure of such considerable public importance: but as the Gas-lights are evidently not so brilliant or powerful, as they were at their first adoption; and as we have witnessed in many instances the deposit of tarry matter on the glasses which

surround the lamps, during its combustion, there is manifestly proof, that the concern is not superintended in the *best possible way.*

We have offered the preceding observations, not to depreciate the advantages of the Gas-light, but for the purpose of affording a hint to the Gas Companies, of the true nature of their tenure with the public. We have previously remarked, and we again assert, that the use of Gas-lights for the street lamps, appears in many respects advantageous, and ought to be duly appreciated by the public. But if the Gas Companies wish to extend the introduction of their lights to a much wider field than at present, or have a correct view of their ultimate interests, they will rigidly adhere to the following conditions:—procuring the purest coals that can be obtained, for the manufacture of the gas:—by every *possible* attention to its purification:—and by a due and even liberal regard to the convenience, comfort, and health of the community.

THE END.

S. Gosnell, Printer, Little Queen Street, London.